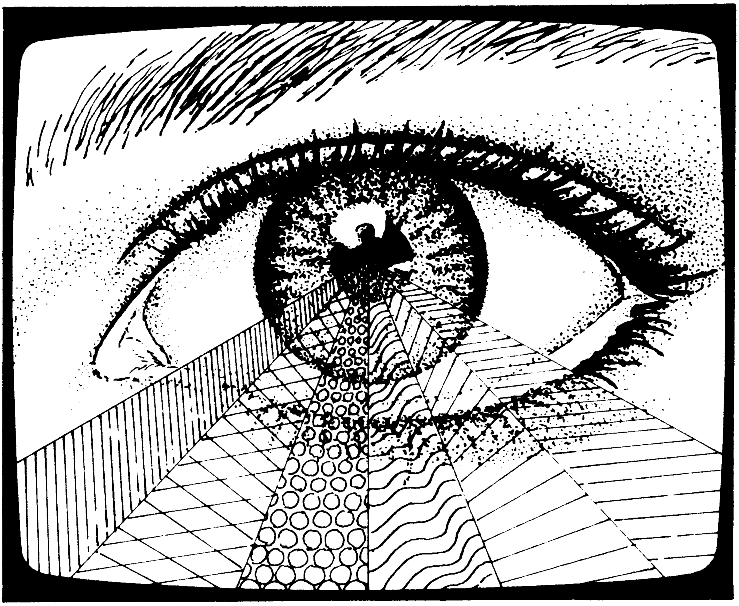
COMMODORE 64

Peripheral Vision™



An Advanced Graphics Package
For Use With The Edumate™ Light Pen

futurehouse

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All Futurehouse programs are warranted to load and run. If defective, return original media for free replacement within 30 days of receipt of order.

Magnetic media may not be copyable on user's system using standard copying procedure. If media wear out, Futurehouse will provide a new copy if the original media is returned with a $5.00 replacement fee within one year from date of purchase.

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Congratulations on purchasing PERIPHERAL VISION. You now have the most complete art and graphics package available for the Commodore 64. Peripheral Vision uses the Edumate Light Pen and was designed by our light pen engineer David Hock.

You will enjoy hours of fun and entertainment exploring the many features of Peripheral Vision. Even non-artists will be amazed at the creativity that will flow from their Edumate Light Pen.

Here are just a few of the endless features you are offered with Peripheral Vision:

- 15 different colors with which to draw
- Complete fill capabilities
- 6 brush stroke widths
- Print artwork to printer
- 35 pre-defined textures or create your own textures
- Copy designs
- Zoom
- Draw pre-defined circles, squares and triangles

ACTIVATING THE LIGHT PEN

The light pen should be inserted into Control Port 1. The light pen is TURNED ON by pressing either the [Commodore] key located on the bottom left of the keyboard, or the [F-7] key located on the bottom right. Note: Certain keys on the keyboard's bottom row will be disabled after inserting the light pen. These keys are Z, C, B, M, . and the right [SHIFT] key. You will not be able to use these keys when selecting names for various files during the course of the program.

LOADING AND RUNNING PROGRAMS

Type LOAD"*",8 and then press [RETURN]. When the READY prompt appears, type RUN, then press [RETURN]. After booting up, an introductory screen appears, and a preliminary program loads. In the preliminary program you are asked to synchronize your light pen with your screen by pointing your light pen at the center of the screen and activating the pen. Activate the pen for 2 or 3 seconds, keeping the pen pointed at the cross *until* the printer option screen appears. You are now asked to select a printer option; if you do not have a printer, or the options do not include your printer configuration, be sure to select NO PRINTER. Finally, you are asked if you want to design your own textures.

DESIGNING TEXTURES

In the main program, you are able to paint on your screen with a variety of textures, including solid colors. Peripheral Vision comes with many pre-defined textures to choose from. If you prefer, you can design up to six textures at one time of your own. Each set will be saved on a disk. A texture can be made up of two primary colors and the background color (white). You design the textures using two shades of gray to represent the primary colors. These primary colors can be changed to any two colors during the main program. To design a texture, select the Color 1 or Color 2 option, and point your light pen at the screen where you want the color to appear. The large portion of the screen will display a blown up version of the texture. How the texture will actually appear is displayed in the upper right portion. You can erase by selecting the Erase option. If you want to clear the entire screen, press [CLR/HOME].

ENTERING THE MAIN PROGRAM

When you exit the texture design mode, a menu appears on the screen with various options to save a texture set, format a data disk, design another texture set, or exit to the main program. When you save a texture set, or save any data, you must insert a formatted disk other than the Peripheral Vision program disk. This is referred to as a data disk. All data is saved under a name that you type in from the keyboard, using allowable keys. After you type in the name you want (8 or fewer characters), press [RETURN] and the disk I/O operation will commence.

When you exit to the main program, the title screen reappears, and the main program loads. Once you are in the main program, if you want to design a new texture, you must turn off your computer and reload Peripheral Vision.

MAKING SELECTIONS

All program options are selected by pointing your light pen at boxes representing the desired mode, and pressing the light pen button. The boxes are arranged in three menus across the top and bottom of the drawing screen. The bottom menu actually consists of two menus. To go back and forth between these two menus, touch your light pen to the extreme right box on the menu.

COLORS

The Commodore screen normally is divided into 320 pixels in a horizontal direction, by 200 pixels in a vertical direction. A pixel is a dot of light that is the smallest unit that appears on the screen. To allow the use of colors, the horizontal width of the smallest unit has to double, so there are effectively 160 pixels available in the horizontal direction. Due to the hardware limitations of the Commodore 64, the screen will not allow more than three pre-defined colors to inhabit the same 4-by-8 pixel space. Therefore, the color menu is divided into three categories; colors of the same category will not "mix" within the 4-by-8 pixel block. Since this block is a very small area compared to the size of the total screen, there will be little effect on the overall quality of any picture you create. There are sixteen colors available, with white selected as the "erase" color. The color menu is located along the top of the drawing screen. The colors are arranged as follows: starting from the left side of the color menu, the first color is white (Erase), the next five colors make up Category 1, the following five comprise Category 2, and the last five are Category 3. Note that the colors can be altered by adjusting the tint and color controls on your color TV or monitor.

MAIN MENU

The menu for all command options is located along the bottom of the drawing screen. There are two levels of menus. To go from one menu to the other, touch the far right box with your light pen. The options for the first level are, from left to right:

DISK I/O Select this option to save or load picture files. After you choose LOAD or SAVE, type in the name of the picture and press [RETURN]. You may only enter a name which is eight or less characters in length. Be sure your drive is ON LINE!

FILL This command enables you to fill any closed outline with textures or solid colors. After selecting the option, position your light pen within the area you want to fill and press the button. Four arrows will travel from this point until the outline you want to fill is encountered. One arrow will then trace the outline. If the outline is not closed with colors of the same color category the arrow will reverse its direction at any discontinuity and the fill will not take place. By noting where the arrow reversed direction, you can close the gap and attempt to fill again.

PRINT Choosing this mode dumps your screen to the printer. Be sure your printer is ON LINE, and that you chose the proper printer configuration at the beginning of the program. NOTE: If you ever want to abort a printout while the printer is printing, hold the [RETURN] key down until the printer stops. **See important note on last page.**

MIRROR In this mode, everything you draw will be mirrored in a horizontal and vertical direction for a kaleidoscope effect. Upon entering the Zoom mode, this option will be deactivated.

ZOOM After activating this option, point your light pen at the area you want to magnify and press the light pen button. That area of the screen will be magnified eight times. You can scroll in four directions to view the entire screen by using the cursor control keys. The color menu remains accessible. To return to normal mode, point at the arrow on the color menu. *Note:* The right shift key is disabled when your light pen is inserted, so you must use the left shift key when using the cursor controls.

FOCUS This option allows you to change the accuracy of the light pen. There is a trade-off in speed. There are five levels, with Level 5 the most precise, but slowest drawing.

DRAW This lets you draw on the screen. This is the most commonly used mode.

BRUSH WIDTH This option changes the width of the lines the light pen draws on the screen. Pointing to the top of the box scrolls the widths in one direction, and pointing to the bottom scrolls in the other direction. The current width is displayed in the width window.

WIDTH WINDOW The display for the current width is here. Pointing to this window also sets the texture to the solid color, allowing rapid return to this form.

COLOR 2 This option creates a secondary color for the textures. After activating, select a color from the menu of a different category from the primary color. You can also select white (Erase) or the primary color as a secondary color for an increased variety of textures.

TEXTURES Selecting this mode changes the texture in which you draw/fill. Pointing to the top of the box scrolls the textures in one direction, and pointing to the bottom scrolls in the other direction. You have 35 predefined textures with which to draw.

SHAPE MENU This selection brings you to the second level menu, where you access various computer drawn shapes and commands to manipulate shapes.

SHAPE MENU

When drawing any shape, you must place points defining that shape on the screen. Different shapes require a different number of defining points. A defining point is represented on the screen by a crosshair, or X shape. A defining point is initially positioned on the screen by pointing the light pen and pressing the button. It is important to remember that you are not committed to this position until you release the button. You can move the crosshair on the screen by keeping the button pressed and moving the light pen. The crosshair will follow. Once you release the button, the crosshair position becomes fixed. It is easy to keep track of the number of defining points necessary to specify any shape. After picking a shape option, the second box from the right, known as the status indicator, will display a number. This is the number of steps that remain to be determined by you in order to draw the shape. Each required defining point counts as one step. The final step is the command to actually draw the shape. This final step is the same for all shapes, and is accomplished by pointing the light pen anywhere on the open screen and pressing the light pen button. The options for the second level are, from left to right:

SINGLE LINE The first menu option lets you draw single lines. The number of steps needed are three. You must first position the 2 end points to define the line. The final step is to draw the shape, as previously described.

CONSECUTIVE LINE This is similar to the Single Line option except that you are able to continuously draw lines end-to-end.

TRIANGLE Draws triangles. There are four steps, and three defining points, one for each triangle apex.

RECTANGLE Draws all rectangular shapes, including squares. Requires three steps, and two defining points. The two points describe the diagonal of the rectangle.

CIRCLE Draws circles. Requires three steps, and two defining points; one for the center, and one for the outside radius.

DRAW Same as the draw mode on the level one menu.

CHARACTERS This option permits you to use the Commodore character set on the screen. Pointing to the top of the box scrolls through the characters in one direction, while pointing at the bottom scrolls through the opposite direction. To place a character, point to the screen and press the light pen button.

MOVE Allows you to move single pixel outlines, open or closed. After activating this mode, point your light pen at a spot close to, but NOT on, the outline you want to move. Arrows similar to those described in the Fill option will appear after you press the light pen button. The arrow closest to the outline will "lock-on" and trace the outline. You can then move this arrow anywhere on the screen; it will continuously trace the outline. Once the outline is situated where you want it point to the Move box, and the move will be completed. It is important to remember that the outline transferred will be of single pixel width only. Therefore, if you have a shape whose perimeter is wider than single pixels, you can elect to move the inner or outer outline, by initially pointing the light pen on the inside or outside of the shape, respectively. You can use this option to change the color of outlines by entering this mode with a different color, and not changing the outline's location on the screen.

COPY This is very similar to the Move option, except that instead of the original shape being transferred to another location on the screen, it is copied to the new location selected.

BLANK BOX For future expansion.

CANCEL Selecting this option will cancel shape defining points placed on the screen, in the reverse order that you placed them.

STATUS INDICATOR Shows the number of pending shape operations that remain to be completed, including the number of shape defining points that have to be assigned.

ARROW Returns you to the main menu.

ADDITIONAL NOTES

Pressing the [F-3] key toggles the menus on and off the screen, allowing you to draw on the space beneath the menus. *Pressing the [CLR/HOME] key erases the screen.* Certain colors, such as red and black, make the light pen's triggering signal less effective. If you have difficulty drawing over or erasing any color, adjusting your monitor's brightness and contrast levels should alleviate any problem.

We hope you enjoy creating with Peripheral Vision. Here at Futurehouse we are always expanding our exciting light pen product line. Keep an eye on your dealer's shelves for new and innovative products from Futurehouse.

NOTE FOR PROGRAMMERS:

Since all screens created with Peripheral Vision are saved to the disk as binary program files, it should be fairly simple to use them in any program you write. It is strongly suggested that you read Chapter 3 of the Commodore 64 Programmer's Reference Guide to completely familiarize yourself with graphics on the C-64.

There are three things you need to know: the starting locations used in Peripheral Vision for the video matrix, the bitmap, and color memory. These are 23552, 24576, and 49152 decimal, respectively. You will notice the address given for the color memory starting location differs from the usually fixed beginning address of 55296. This is because color memory is loaded into a buffer. You will have to transfer the information to the necessary locations.

Keep in mind that the locations for the video matrix and the bitmap might not be convenient for your particular program. You might need to relocate them. How to actually do this, and how to "turn on" a Peripheral Vision screen, is best illustrated with an example.

Suppose yu have a BASIC program with an ending address of 17500, and a Machine Language program residing at locations 30720 to 31000.

The 64K of memory in the C-64 is broken down into 4 banks of 16K each. The VIC chip, responsible for graphics on the C-64, can only access one bank at a time. The BASIC program takes up all of the memory comprising Bank 0, so you will have to locate the Peripheral Vision screen in another bank. The bitmap takes up 8K and the video matrix takes up 1K. The only bank with 9K of free memory is Bank 1. Since the default bank is Bank 0, you will have to change the VIC chip bank pointer to point at Bank 1 instead of Bank 0.

An additional constraint is that the starting locations for the video matrix can occur in 1K steps and the starting locations for the bitmap can occur in 2K steps, only. Thus there are 16 potential starting locations in a bank for the video matrix, and 5 potential locations for the bitmap. There is 8K of consecutive free memory in Bank 1 with a legal beginning address in the third 2K block. This address is equal to 16384 (beginning address of Bank 1) + 4096 (beginning address of the third 2K block) or 20480. The bitmap can be located from 20480 to 28671 without disturbing the BASIC or Machine Language programs. This is not the only possible location. The 1K video matrix can be located right before the bitmap, from 19456 to 20479. As with the banks, the VIC chip has pointers to these starting locations that will need changing.

One more thing before getting into the actual program example. A Peripheral Vision screen is saved to your data disk in two sections. One section is the color memory, the other is the video matrix and the bitmap. Both will have the English Pound sign prefaced to the name of your screen, and the characters ".CMM" and ".BMP" appended, respectively. Therefore, if the name of your screen is "SCENE," the two sections will appear in your disk directory as "£SCENE.BMP" and "£SCENE.CMM".

In the following listing, there are only 16 lines of actual code. The rest of the lines are REM statements, and can be deleted from the actual program.

```
6 REM **** Program to relocate and use a Peripheral Vision screen.
8 REM **** Lower the top of memory and string pointers to protect the screen.
10 POKE51,255:POKE52,75:POKE55,255:POKE56,75
12 REM **** Load the data for the screen from the data disk.
14 L$="£SCENE.BMP":GOSUB100:L$="£SCENE.CMM":GOSUB100
16 REM **** Relocate the data for the color memory, video matrix, and bitmap.
18 FOR I=49152TO49512+1023:POKEI+6144,PEEK(I):NEXTI
20 FOR I=23552TO23552+1023:POKEI-4096,PEEK(I):NEXTI
22 FOR I=24576TO24576+8191:POKEI-4096,PEEK(I):NEXTI
24 REM **** Before changing the bank pointer,
26 REM * you have to set the bank select bits to outputs.
28 POKE56578,PEEK(56578)OR3
30 REM **** Change the pointer to point at Bank 1.
32 POKE56576,(PEEK(56576)AND252)OR2
34 REM **** In the above POKE, we used the number 2 to point at the first bank.
36 REM * Values to point at other banks are listed in Chapter 3
```

```
38 REM * of the Programmer's Reference Guide.
40 REM **** Change the VIC chip's video matrix pointer.
42 POKE53272,(PEEK(53272)AND15)OR48
44 REM **** In the above POKE, we used the number 48 to point at the fourth
46 REM * 1K block. Values to point at the other 15 potential locations
48 REM * are found in Chapter 3 of the Reference Guide.
50 REM **** When you move the video matrix, you have to tell the KERNAL'S
52 REM * screen editor where you moved it to.
54 POKE648,76
56 REM **** The number 76 was arrived at by dividing the address of the
58 REM * video matrix, 19456, by 256.
60 REM **** Tell the VIC chip where to find the bitmap.
62 POKE53272,(PEEK(53272)AND240)OR4
64 REM **** In the above POKE, we used the number 4 to point at the third
66 REM * 2K block. Values to point at the other 4 potential locations
68 REM * are found in Chapter 3 of the Reference Guide.
70 REM **** Two more POKEs are necessary, to turn on the VIC chip's
72 REM * Multi-color Bitmap mode.
74 POKE53265,PEEK(53265)OR32:POKE53270,PEEK(53270)OR16
76 REM **** That's all there is to it!
98 REM **** Basic subroutine, using KERNAL routines, to load programs.
99 REM **** First store the name of the file to load, somewhere in memory.
100 L=LEN(L$):FOR I=1TOL:POKE50175+I,ASC(MID$(L$,I,1):NEXTI
102 REM **** Use KERNAL routine SETLFS
104 POKE780,4:POKE781,8:POKE782,255:SYS65466
```

```
106 REM **** Use KERNAL routine SETNAM
108 POKE780,L:POKE781,0:POKE782,196:SYS65469
110 REM **** Use KERNAL routine LOAD
112 POKE780,0:SYS65493
114 RETURN
116 REM **** A routine similar to the above can be used to save files.
118 REM * You can read about it in the Programmer's Reference Guide,
120 REM * in Chapter 5, under the KERNAL routine Function Name: SAVE.
```

***IMPORTANT NOTE ON PRINTER OUTPUT:**
In order for the printer to operate correctly, it must be daisy-chained to your disk drive, and both the drive and the printer must be turned on.

PERIPHERAL VISION
DOCUMENTATION UPDATE

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Since the original introduction of Peripheral Vision, some additional features have been added which are not reflected in the documentation. These are as follows:

1) When the CIRCLE option is selected, the circle you draw can be scaled to ellipses. This is accomplished by pressing a number key from 1 to 9 before selecting the circle-defining points. Pressing the number 1 key will produce an ellipse stretched the most in the horizontal direction. Keys up to the 5 key generate more circular ellipses. The 5 key will give you a true circle. Keys up to the 9 key will produce less circular ellipses, and the number 9 key will produce an ellipse stretched the most in the vertical direction.

2) The section of the documentation describing the shapes menu shows a BLANK BOX as a menu selection, slated for future expansion. A new feature has been added, called the BLOCK MOVE. It enables you to copy a rectangular area on the screen to another area of the screen. The source rectangular area is set up exactly like the RECTANGLE option. Once the source rectangle-defining points have been selected, a copy of them can be moved around the screen until properly positioned. Releasing the light pen button then freezes the target rectangle in place. Pointing the light pen at the BLOCK MOVE option box completes the operation; the contents of the source rectangle are copied into the target.